

## PROVENANCE OF FOSSIL PENGUIN FROM WESTERN VICTORIA

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## Abstract

The field occurrence and age of the holotype of *Arthropodyptes gilli* Simpson are described. Although the specimen was not found in place, the attached fossils, preservation, circumstantial evidence and fluorine test show the fossil to be of Miocene age.

## Field Occurrence

At the request of Dr. G. G. Simpson, this paper sets out data relative to a fossil penguin humerus found *non in situ* on the Glenelg R. in Western Victoria, and described in an accompanying paper as *Arthropodyptes gilli* Simpson, new genus, new species. The bone was found resting on a freshly eroded horizontal platform of grey Miocene marine marl on the left (E.) bank of the Glenelg R. at the downstream (S.) end of Devil's Den, N. of Dartmoor, Western Victoria (see Fig. 1). The site is marked "Bw" on the map published by Singleton (1941, p. 46). The specimen was found by the writer on 12 November 1950, and was first determined by Dr. J. Allan Berry of New Zealand.

River cliffs of 60 to 100 ft. characterize this part of the river valley, and they consist of fawn to yellow Pleistocene calcareous dune, beach, and shallow marine

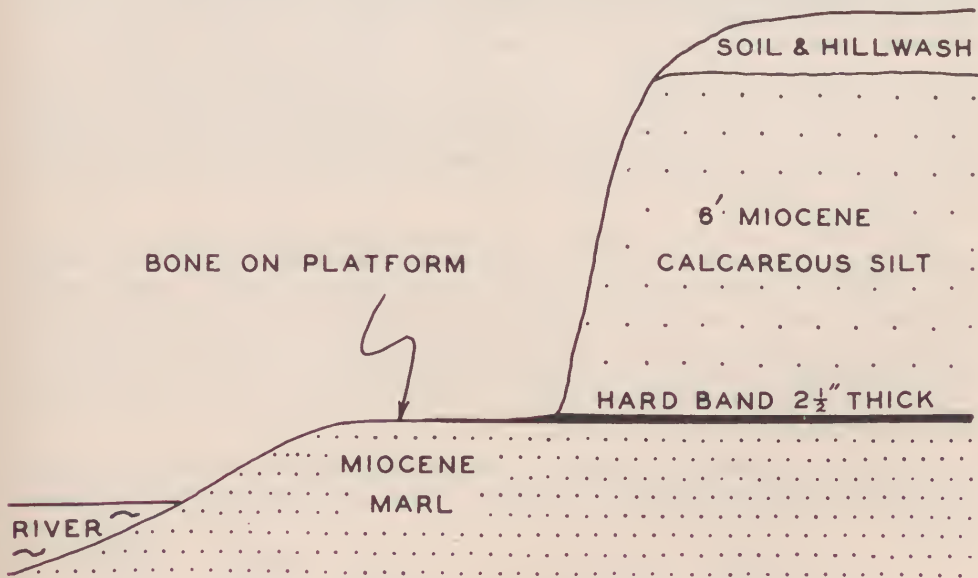


FIG. 1.—Geological section of site on Glenelg R., Victoria, from which came fossil penguin.

sands overlying disconformably grey to bluish grey Miocene marine calcareous clayey silt and marl. The Tertiary beds at the contact between the two formations are in places bored by marine boring molluscs (*Pholas*) and the shells are preserved in many of the burrows. A typical section shows 20 ft. of Pleistocene beds resting on 70 ft. of Tertiary strata. Boutakoff and Sprigg (1953) have included the Tertiary rocks in their Glenelg Group and the Pleistocene rocks in the Whaler's Bluff Formation of the Normanby Group. The base of the Werrikoo Member of the Whaler's Bluff Formation has been regarded as the base of the Pleistocene (Gill 1957*b*). The Tertiary rocks belong to the Balcombian Stage (in its wider definition) of the Miocene Period (cf. Singleton 1941, Crespín 1943).

### Age of Penguin Fossil

When the penguin humerus was collected, it gave the impression that the bone had been eroded recently from the Miocene bed by gentle river erosion, being left behind because of its weight. It had not been transported because delicate *Dimya* shells were attached to the heavy mineralized bone. It is considered that the fossil bone came from the Miocene formation because:

1. Cemented to the bone are specimens of the marine lamellibranch *Dimya dissimilis* Tate 1885, which must have grown on the humerus as it lay on the sea floor. *Dimya* is found in the Miocene beds on which the bone lay, but not in the overlying Pleistocene beds. The genus is unknown in post-Miocene beds in Victoria, and it is not known to be living in Victorian waters at the present time. *Dimya corrugata* Hedley 1902 is the only living Australian species, and this occurs in the warmer waters of New South Wales and South Australia. It is distinct from the Miocene species attached to the penguin bone. Hedley (1902) found *Dimya corrugata* in dredged material from 63-75 f. (378-450 ft.) off Port Kembla, N.S.W. As described above, there are only two formations of rocks from which the fossil penguin bone could come, and they are completely different in facies. The Miocene formation consists of fine deeper water sediments with an appropriate fauna, while the Pleistocene formation consists of much coarser sediments of sand size with some lenticles of gravel. At the base of the Pleistocene formation in this area is a highly fossiliferous shallow water marine bed overlain by what appears to be beach deposits, then by sand ridge and dune structures. *Dimya* belongs to the Miocene and not the Pleistocene facies.

The different types of sediments and their relative positions have resulted in different types of preservation. The fossils in the Pleistocene formation at Devil's Den consist of casts and molds except where the shells are calcitic (e.g. *Ostrea*). The beds are leached and fully oxidized. On the other hand, the Tertiary beds are bluish grey to grey, unoxidized, and both aragonitic and calcitic shells are preserved. The *Dimya* shells attached to the penguin bone are unaltered. The bone itself is not leached, but heavily mineralized. Thus it fits the provenance of the Tertiary beds and not that of the Pleistocene beds.

2. A fluorine-phosphate analysis of the penguin humerus was kindly made by the Chief Government Chemist of Victoria, Mr. W. R. Jewell, with the following results:

Fossil	%F	%P <sub>2</sub> O <sub>5</sub>	Fluorine Index
Penguin humerus (holotype) .. ..	3.14	30.3	10.4
Bone from Miocene formation .. ..	2.69	26.8	10.0

No other bone was found at Devil's Den, either in the Miocene or in the Pleistocene rocks. A bone from the same Miocene formation at Portland was therefore used as control. No fluorine index as high as 10 has been found in Victoria for bones of post-Tertiary age, not even in the basaltic areas where the concentration of fluorine in the rocks is higher. There are no volcanic rocks in the Devil's Den area. On the other hand, the fluorine index is consistent with the indices of bones from mid-Tertiary localities (Gill 1955, 1957a).

The evidence thus leads to the conclusion that the penguin bone is of the age of the Miocene marine formation on which it was found. At the same time as the penguin bone was collected, the following Miocene fossils were obtained at Devil's Den:

- Dentalium (Fissidentalium) mawsoni* Ludbrook
- Dimya dissimilis* Tate
- Glycymeris cainozoica* (Woods)
- Limopsis maccoyi* Chapman
- Murrawia catinuliformis* (Tate)
- Natica polita* Woods
- Protochiton granulatus* (Ashby & Torr)
- Volutilithes antiscalaris* (McCoy).

Brown (1957) has recorded Miocene polyzoa from this same site (loc. X).

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